

5 Sub A17 1. A system for transporting a secondary communication signal from a secondary synchronous optical network (SONET) ring on a primary synchronous optical network (SONET) ring which has a primary communication signal, wherein the secondary communication signal has secondary overhead including secondary section overhead and the primary communication signal has primary overhead including secondary section overhead, the system comprising:

10 a first adapter assembly adapted to receive the secondary communication signal from the secondary SONET ring and the primary communication signal from the primary SONET ring, to combine the secondary overhead with the primary overhead to form a transport overhead wherein the secondary section

15 overhead is combined into the unused space of the primary overhead, to combine the secondary payload with the primary payload to form a transport payload and to combine the transport overhead with the transport payload to form a transport communication signal for transport across a communications path of the primary SONET ring; and

20 20 a second adapter assembly adapted to receive the transport communication signal from the primary SONET ring, to remove the secondary overhead from the transport overhead, to remove the secondary payload from the transport payload, and to combine the secondary overhead with the secondary payload to create the second secondary communication signal for 25 transport to the secondary SONET ring.

2. The system of claim 1, wherein the second adapter assembly is further adapted to remove the primary overhead from the transport overhead and the primary payload from the transport payload, to combine the primary overhead with the primary payload to form a primary communication signal for 30 transport in the primary SONET ring.

5 3. The system of claim 1, wherein the first adapter assembly
comprises:
 a first multiplexer adapted to separate the primary overhead from the
 primary payload;
 a second multiplexer adapted to separate the secondary overhead from
10 the secondary payload;
 a converter adapted to receive the secondary overhead from the second
 multiplexer and the primary overhead from the first multiplexer and to load the
 secondary overhead into available overhead space of the primary overhead,
 thereby creating the transport overhead;
15 a cross connect adapted to receive the secondary payload from the
 second multiplexer and the primary payload from the first multiplexer and to
 combine the secondary payload with the primary payload to form a transport
 payload; and
 a third multiplexer adapted to receive the transport overhead from the
20 converter and the transport payload from the cross connect and to combine the
 transport overhead with the transport payload to form the transport
 communication signal.

5 4. The system of claim 3, further comprising a processor
communicably connected to the first multiplexer, the second multiplexer, the
converter, the cross connect, and the third multiplexer, the processor adapted to
control the reception of the primary communication signal and the secondary
communication signal, the loading of the secondary overhead into the unused
10 overhead space of the primary overhead, and the formation of the transport
communication signal.

5. The system of claim 1 wherein the second adapter assembly comprises:

a first multiplexer adapted to separate the transport overhead from the transport payload;

a converter adapted to receive the transport overhead from the first multiplexer and to remove the secondary overhead from the transport overhead to isolate primary overhead;

a cross connect adapted to receive the transport payload from the first multiplexer and to separate the secondary payload from the transport payload to isolate the primary payload;

a second multiplexer adapted to receive the primary overhead from the converter and the primary payload from the cross connect and to combine the primary overhead with the primary payload to form a primary communication signal; and

a third multiplexer adapted to receive the secondary overhead from the converter and the secondary payload from the cross connect and to combine the secondary overhead with the secondary payload to form a secondary transport communication signal.

5 6. The system of claim 5, further comprising:
a processor communicably connected to the first multiplexer, the
converter, the cross connect, the second multiplexer, and the third multiplexer,
the processor adapted to control the reception of the transport communication
signal, the removal of the secondary overhead, and the formation of the primary
10 communication signal and the secondary communication signal.

7. The system of claim 1, wherein the secondary overhead includes
line overhead (LOH).

15 8. The system of claim 1, wherein the secondary section overhead
includes regenerator section overhead (RSOH).

9. The system of claim 1, wherein the secondary section overhead
includes multiplexer overhead (MSOH).

20 10. The system of claim 1, wherein the primary SONET ring is
operated by a first carrier and the secondary SONET ring is operated by a
second carrier.

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A27 11. An apparatus for transporting a transport communication signal from a synchronous primary SONET ring to a secondary primary SONET ring, the transport communication signal having a transport overhead containing a secondary overhead including secondary section overhead and a transport payload containing a secondary payload wherein the transport overhead was
10 formed by combining the secondary overhead with of a primary overhead wherein the secondary section overhead was combined into the unused space of the primary overhead, the apparatus comprising:

an adapter assembly adapted to receive the transport communication signal from the primary SONET ring, to remove the secondary overhead from the
15 transport overhead, to remove the secondary payload from the transport payload, to combine the secondary overhead with the secondary payload to create a secondary communication signal and to transmit secondary communication signal to the secondary primary SONET ring.

20 12. The apparatus of claim 11, wherein:

the transport overhead contains primary overhead including primary section overhead and the transport payload contains primary payload, wherein the adapter assembly is further adapted to remove the primary overhead from the transport overhead, to remove the primary payload from the transport
25 payload, and to combine the primary overhead with the primary payload to form a primary communication signal.

5 13. The apparatus of claim 11 wherein the adapter assembly
comprises:
 a first multiplexer adapted to receive the transport communication signal
and to separate the transport overhead from the transport payload;
10 a converter adapted to receive the transport overhead from the first
multiplexer and to remove the secondary overhead from the transport overhead
to isolate the primary overhead;
 a cross connect adapted to receive the transport payload from the first
multiplexer and to separate the secondary payload from the transport payload to
isolate the primary payload; *C*
15 a second multiplexer adapted to receive the primary overhead from the
converter and the primary payload from the cross connect and to combine the
primary overhead with the primary payload to form the primary communication
signal; and
 a third multiplexer adapted to receive the secondary overhead from the
20 converter and the secondary payload from the cross connect and to combine the
secondary overhead with the secondary payload to form the secondary
communication signal.

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5 14. The apparatus of claim 13, further comprising:
a processor communicably connected to the first multiplexer, the
converter, the cross connect, the second multiplexer, and the third multiplexer,
the processor adapted to control the reception of the transport communication
signal, the removal of the secondary overhead, and the formation of the primary
10 communication signal and the secondary communication signal.

15. The apparatus of claim 13, further comprising an interface adapted
to receive the transport communication signal from the primary SONET ring and
to transmit the transport communication signal to the first multiplexer.

16. The apparatus of claim 13, further comprising an interface adapted
to receive the primary communication signal from the second multiplexer and to
transmit the primary communication signal to the primary SONET ring.

17. The apparatus of claim 13, further comprising an interface adapted
to receive the secondary communication signal from the third multiplexer and to
transmit secondary communication signal to the secondary SONET ring.

18. The apparatus of claim 11, wherein the secondary overhead
includes line overhead (LOH).

15 19. The apparatus of claim 11, wherein the secondary section
overhead includes regenerator section overhead (RSOH).

20 20. The apparatus of claim 11, wherein the secondary section
overhead includes multiplexer overhead (MSOH).

5 21. The apparatus of claim 11, wherein the primary SONET ring is
operated by a first carrier and the secondary SONET ring is operated by a
second carrier.

Sub A37 22. A method of preparing a communication signal in a primary
10 synchronous optical network (SONET) ring for transport to a secondary
synchronous optical network (SONET) ring, the communication signal having a
transport overhead including a secondary overhead and a transport payload
including a secondary payload wherein the secondary overhead includes a
secondary section overhead and wherein the transport overhead was formed by
15 combining the secondary overhead with a primary overhead wherein the
secondary section overhead was combined into the unused space of the primary
overhead, the method comprising:
 removing the secondary overhead from the transport overhead;
 removing the secondary payload from the transport payload; and
20 combining the secondary overhead with the secondary payload to create
a secondary communication signal.

25 23. The method of claim 22, further comprising the step of transmitting
the secondary communication signal to the secondary SONET ring.

25 24. The method of claim 22 wherein the transport overhead contains
primary overhead including primary section overhead and the transport payload
contains primary payload, and wherein the method further comprises:
 combining the primary overhead with the primary payload to create a
30 primary communication signal.

25. The method of claim 22, wherein the secondary overhead includes
line overhead (LOH).

5 26. ~~The method of claim 22, wherein the secondary section overhead includes regenerator section overhead (RSOH).~~

27. ~~The method of claim 22, wherein the secondary section overhead includes multiplexer overhead (MSOH).~~

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28. The method of claim 22, wherein the primary SONET ring is operated by a first carrier and the secondary SONET ring is operated by a second carrier.

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29. A method of transporting a secondary communication signal from a secondary synchronous optical network (SONET) ring across a communications path of a primary synchronous optical network (SONET) ring, the secondary communication signal including a secondary overhead and a secondary payload wherein the secondary overhead includes a secondary section overhead, 10 comprising the steps of:

receiving a secondary communications signal into an first adapter assembly communicably connected to the primary SONET ring and the secondary SONET ring, and, in the first adapter assembly, combining the secondary overhead with a primary communications signal overhead to form a 15 transport overhead wherein the secondary section overhead is combined into the unused space of the primary overhead and combining the secondary payload with a primary communications signal payload to form a transport payload, and combining the transport payload and the transport overhead to form a transport communication signal;

20 transporting the transport communication signal across a communications path through the primary SONET ring to a second adapter assembly communicably connected with the secondary SONET ring and the primary SONET ring; and

25 in the second adapter assembly, removing the secondary overhead from the transport overhead, removing the secondary payload form the transport payload and combining the secondary overhead with the secondary payload to recreate the secondary communication signal.

30. The method of claim 29, further comprising the step of transporting 30 the secondary communication signal to secondary SONET ring.

31. The method of claim 29, wherein the secondary overhead includes line overhead (LOH).

5 32. The method of claim 29, wherein the secondary section overhead includes regenerator section overhead (RSOH).

33. The method of claim 29, wherein the secondary section overhead includes multiplexer overhead (MSOH).

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34. The method of claim 29, wherein the primary SONET ring is operated by a first carrier and the secondary SONET ring is operated by a second carrier.

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